Mysteries Surrounding the Origin of the Yayoi People in Japan: Genetics, Language, and Rice Farming

— Historical Musing —

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Abstract: This essay explores the origin of the Yayoi people referring to genetics, language, and rice farming, starting from a hypothesis based on recent research.

要約：このエッセイは最近の研究に基づいた仮説から始めて、日本の弥生時代の起源について、遺伝子、言語、そして、稲作の観点から展望するものです。

Introduction

The history of ancient Japan is filled with mysteries. Both the origin of its people and their language are still actively debated. One of the key elements in this debate is about the Yayoi people. About 3000 years ago, the second wave of immigrants arrived at the Japanese archipelago and joined the first inhabitants, the Jomon people (considered the direct ancestors of the Ainu people). The newly-formed group, the Yayoi people, is said to be the direct ancestors of the present-day Japanese. Are they really?

Reflecting recent advances in the literature, we begin with a hypothesis roughly based on the research of Robbeets et al. (2021). Then, the hypothesis will be examined carefully as we proceed.

Hypothesis: Around 9000 BP (before present), a millet-farming civilization emerged in the West Liao River basin (southern Northeast China). Farming lead to population growth and the spread of its people and their language to the surrounding areas. Some population groups moved southward and at around 6500 BP, split into two subgroups. They are the Proto-Koreanic and Proto-Japonic peoples and were both moving toward the Korean Peninsula. At around 3500 BP, the Proto-Japonic people encountered wet-paddy rice farmers from China moving through the Liaodong and the Shandong Peninsulas. At around

3000 BP, the Proto-Japonic people migrated to Japan, introduced wet-paddy rice farming and a new language, and formed the basis of the Yayoi people. [helpful image: https://www.nature.com/articles/s41586-021-04108-8/figures/4]

Note that the main point of the aforementioned research is the emergence of the Transeurasian languages, including Turkic, Mongolic, Tungusic, Koreanic, and Japonic languages (more or less corresponding to the so-called Altaic languages). However, our Hypothesis above focuses on the Japanese connection.

Also, here is a caveat. Some people use the term 'Yayoi people' to refer to the immigrants to the Japanese archipelago during the Yayoi period. However, we use it to refer to the population resulting from the mixture of the second wave immigrants and the Jomon people.

Before proceeding, let us comment on the initial timing of the Yayoi period which is associated with the arrival of the second wave immigrants. In the past, it was said to be around 2300 BP (300 BCE). However, recent research consistently estimates the timing at around 3000 BP (e.g., Robbeets et al., 2021; Cooke et al, 2021; Leipe et al., 2020).

Chinese vs. Proto-Japonic (Part 1)

Our first question about the Hypothesis is the relationship between the Proto-Japonic and the Chinese people who encountered on the Korean Peninsula at around 3500 BP. According to the Hypothesis, at least Proto-Japonic people (from the West Liao River basin) migrated to the Japanese archipelago, bringing their language. But what about the Chinese people? Did the both populations mixed and migrated together?

As for the language, the Chinese people must have spoken some form of a Sino-Tibetan language or a mixture of Sino-Tibetan and Austronesian languages. Although there are theories that relate the Yayoi-period Japanese with these language families, it seems more plausible to associate the Yayoi-period Japanese language with the Proto-Japonic as well as Korean and Altaic languages (e.g., Robbeets et al.). If this is the case, the Chinese people cannot be the leading force behind the migration.

However, we still need to figure out what happened to the Chinese rice farmers. For this, we turn to genetic research (Cooke et al., 2021). First, the genetic composition of the Yayoi people is a more or less even mixture of the Jomon people and the immigrants. However, the genetic components of the immigrants include only the northern origins (the West Liao River and the Amur basins) and do not include the influence of any Chinese populations (neither the Yellow River nor the Yangtze River basins). This suggests that the Chinese farmers did not migrate to the Japanese archipelago, at least along with the Proto-Japonic. But why? And then, how did the Proto-Japonic people acquire rice farming?

But before proceeding, we need to comment on the above genetic research (Cooke et al., 2021). It examines only two Yayoi remains. Thus, it is possible that these two individuals not properly represent the entire Yayoi people. However, it still affirms the *existence* of migration of only the Proto-Japonic not involving the Chinese. So, depending on a position, we still need to solve different set of mysteries. Since this writing is just a musing, we *assume* that the research of Cooke et al. (2021) is sustained. Now, before exploring an earlier question, “why did the Chinese migrate then?,” we explore more about the Chinese rice farmers.

Rice Farming

As cited in the literature (e.g., Qin & Fuller, 2019), rice farming originated on the Yangtze River basin, dry-field rice first, and then wet-paddy rice. We know that wet-paddy rice farming is very labor intensive, involving sophisticated water management. This cannot be done without a highly organized society with a large population. Then, such a situation would be associated with population growth, not migration to other areas. So, the farmers would stay where they are, of course, unless they cannot.

And at least some rice farmers on the Yangtze River basin probably could not. There are at least two reasons. At around 4000 BP, the Yangtze civilization collapsed when the the rice farming infrastructure was destroyed by the catastrophic climate change (Haiwei et al., 2022). In addition, this same climate change pushed the Han people from the Yellow River basin southward, replacing the original people on the Yangtze River basin (Yasuda, 2013). These two factors are obviously related. However, we are inclined to think that the second factor was decisive, because the destroyed infrastructure could be rebuilt but the lost territory would be (almost) impossible to regain.

Any way, there was an exodus of people from the Yangtze River basin to every direction. Then, it might be possible that those displaced farmers sailed to the Japanese archipelago. However, we do not think that this happened. Could poor displaced farmers hire a fleet of vessels to travel far? The title of Qin & Fuller’s research (2019) is telling: “Why Rice Farmers Don’t Sail.” But of course, the ruling class may well have sailed to the Japanese archipelago with artefacts and, of course, rice.

In fact, such an idea has been proposed by many. There are multiple books all by Japanese authors, a newspaper article (*The Japan Times*), a number of web sites in support of this idea, except that there is virtually no published research. The proponents of this idea refer to the presence of artefacts, skeletal analysis, and genetic analysis. But if the oceanic migrants were the significant part of the Yayoi people, they eventually overshadow the Jomon people and thus, their language would become dominant as the basis of the Yayoi language. As we have already pointed out, this does not seem likely. Even if such oceanic route existed (we cannot deny this), its impact cannot be as big as that of the immigration of the Proto-Japonic people.

Back to the migrants on the land paths, there must be a subgroup moved northward, most likely along the coast. This must have been a difficult time for the Han people on the Yellow River basin as well. They were invaded from the west. Their states were constantly changing. So, the northern people may have attacked the migrants from the Yangtze River basin. The migrants may have been pushed eastward in the direction of the Korean

Peninsula. At the same time, the north and south populations may have mixed in the mean time.

Also during this migration, the farmers may not have sufficient time to settle in a single place for a long time. So, they may have had to depend on the dry-land rice farming, which is less labor intensive. In addition, the rice varieties must have been made to adapt to the colder climate (e.g., Leipe et al., 2020). But eventually, at least some of them made it to the Korean Peninsula at around 3500 BP (Robbeets et al., 2021).

Chinese vs. Proto-Japonic (Part 2)

By the time the rice farmers from the Yangtze River basin arrived to the Korean Peninsula, the Proto-Japonic people were already there with millet farming. The migration process of the Proto-Japonic people was slower even though millet farming may not require as much infrastructure as rice farming. On the other hand, the Chinese migrants were forced to move fast due to various reasons including political backlash from the turbulent situation around the Yellow River basin. In addition, they must be much more familiar with more sophisticated forms of civilizations.

Here is our speculation about when these two groups met on the Korean Peninsula. The Chinese group was quick to establish their permanent settlement. They probably made the rice more adaptable to the local climate. And they can surely use more hands. They recruited the Proto-Japonic people.

By this time, the Proto-Japonic people had experienced another cultural interaction. When they reached the Korean Peninsula, a subgroup of the Jomon people were still there (Robbeets et al. 2021). The Proto-Japonic and the Jomon peoples co-existed for a while but eventually, the Jomon people’s life started to deteriorate due to the Proto-Japonic people’s increasing use of land for millet farming. Eventually, the Jomon people gave up their life style and were absorbed by the Proto-Japonic culture (Kim & Park, 2020). The Proto-Japonic’s relatively slow and easy-going experience of cultural interaction did not prepare them to work under the Chinese.

So, while learning rice farming, the Proto-Japonic people planned to escape. And from around 3000 BP, they started to escape the Chinese and immigrated to the Japanese archipelago. Since they already had an experience of annexing the Jomon people, they have no difficulty doing the same on the archipelago. In addition, by this time, they have acquired rice farming and probably most importantly, learned to be more ambitious, of course, from the Chinese. As a result, the Chinese stayed behind and part of the Proto-Japonic moved on and started to build the Yayoi culture in Japan. However, it is most likely that part of Proto-Japonic stayed on the peninsula as well.

At this point, we return to the research of Leipe et al. (2020). They report the existence of rice farming in the central highlands of Japan at around 3200 BP. This would be the first confirmed rice farming in Japan and earlier than more commonly held view of 3000 BP. The researchers give two possible scenarios. One is that the Jomon people traveled and brought back the rice from the Korean Peninsula. The other is that there were migrants from the Korean Peninsula. Since this slightly earlier timing does not seem to require us to change our musing, we will not discuss this issue any further. However, it is still interesting to notice the possibility of rice farming starting on eastern highlands far from the Korean Peninsula.

Well, this could be the end of the story about the origin of the Yayoi people. However, according to Cooke's research (2021), there was another, third wave of immigrants to the Japanese archipelago. The resulting populations after the merger is called the Kofun people. This is because the timing of the third wave roughly corresponds to the Kofun period (roughly 300 ~ 600 CE). Their finding is that the Kofun people's genetic composition is substantially different from the Yayoi people's but virtually indistinguishable from the present-day Japanese. Then, it must be the Kofun people, not the Yayoi people, who is the direct ancestor of the present-day Japanese. What happened?

The Third Wave of Immigrants

The genetic composition of the Kofun people surely includes that of the Yayoi people, say, less than 40%. The remaining part appears to be the Chinese origin. To be more specific, the genetic composition of the third wave immigrants includes the genetic materials from both the Yellow River basin and the Yangtze River basin. [helpful image: https://www.science.org/cms/10.1126/sciadv.abh2419/asset/dc168d0c-ac66-4022-a775-c10f208b0a7d/assets/images/large/sciadv.abh2419-f6.jpg]

Probably, the simplest response would be that the Chinese who stayed on the Korean Peninsula eventually came to Japan. They were most likely the mixture of southern and northern Chinese people. Note that the presence of the southern Chinese genes in the Modern Japanese was used to support the idea of direct, oceanic rice migration from the Yangtze River basin. However, we already rejected that idea on the linguistic basis. And the presence of the southern Chinese genes is not a problem for the current discussion.

But weren't the Chinese happy on the Korean Peninsula at the time? As we discussed earlier, those rice farmers wouldn't move unless they have to. So, it is natural to think that they had to. The history of the Korean Peninsula seems to provide an answer, especially as more and more written records are available for this time. The wars among the Three Kingdoms of Korea, Goguryeo, Baekje, and Silla, must have ignited the migration of the Chinese.

However, we must be careful. According to Kim & Park (2020), the population of South Korea started to decline at around 2700 BP and almost disappeared between 2300 and 2000 BP. They have not been able to identify any climatic reasons. Considering the population increase of northern Kyushu after around 2000 BP, they suggest that a large number of people migrated to Japan. [helpful image: https://static.cambridge.org/binary/version/id/urn:cambridge.org:id:binary:20200501184034985-0813:S2513843X20000134:S2513843X20000134_fig3.png]

However, as for the population decline between 2700 and 2300 BP, this may well be the exodus of the Proto-Japonic people. However, the further decline between 2300 and 2000 BP must involve the Chinese people who stayed behind. That is, the Chinese people may have disappeared, or moved elsewhere. We cannot flatly reject the idea of them migrating to Japan. But we are still assuming that the arrival of people with the Chinese origin be after around 1700 BP.

Let us now discuss some political situations. At as far back as around 3000 BP, the landscape began to change in the northern part of Korea. The first kingdom of Korea, Gojoseon, was emerging. It would be natural to consider that they are the descendants of the Proto-Koreanic people, who split from the Proto-Japonic at around 6500 BP. They may have been in contact with the Tungusic people and acquired domestic animals, including horse.

Gojoseon strengthened its power and expanded its territory toward south. By 2300 BP, it was in a position to face the southern half of the peninsula, where the Chinese and the remaining Proto-Japonic were occupying. It is possible that these populations might have formed some sort of state, possibly Jin.

In the mean time, the Han dynasty started to attack Gojoseon and occupied it by 2100 BP. It is quite possible that people fled Gojoseon to Jin. It is not clear how this could have affected the people in Jin. Here is one, probably far-fetched, possibility. When the Han dynasty attacked Gojoseon, they moved the Chinese people from Jin to occupy parts of Gojoseon, simply because they are Chinese and speak the language. Then, this might explain why the population in South Korea plummeted. This could have created a large area of land to occupy. It is possible that more and more people moved southward from Gojoseon and also possible that more and more Chinese people came to the peninsula through the Liaodong and the Shandong Peninsulas. The population of South Korea began to increase at around 2000 BP.

Still during the Han occupation of northern Korea, the kingdom of Goguryeo was strengthening and eventually crushed the Han occupation. By around 1700 BP, they claimed a large territory including all of the northern Korea and far north as well. One factor for this victory may be the use of horse, probably as a means of transportation and not yet for fighting (the latter aspect would be employed by, say, the Mongolians in later years). It is reasonable to consider their people and language Proto-Koreanic and closely related to the people of Gojoseon. By this time (around 2000 BP), Jin was being replaced by Baekje (southwest) and Silla (southeast). As a result, Goguryeo, Baekje, and Silla form the Three Kingdoms of Korea. [helpful image: https://www.worldhistory.org/img/r/p/500x600/5790.jpg]

Reflecting the discussion so far, we assume that Baekje consisted of Chinese farmers with Proto-Koreanic rulers and that Silla consisted of Proto-Koreanic people, originally from Gojoseon. This must be an oversimplification but it does not radically contradict the information available online. There was one more state called Gaya, which may have been the last post of the Proto-Japonic people on the Korean Peninsula. However, it was later absorbed by Silla.

The relationship between the three kingdoms was complicated. But eventually, Baekje was conquered by Silla in 660 CE and Goguryeo, also by Silla in 668 CE. The fall of Baekje forced the Chinese farmers flee to Japan around this time. This must be the source of the Chinese genes (both northern and southern) in the Kofun people and the present-day Japanese. The genetic components of the Yangtze River rice farmers had finally reached Japan, more than 1000 years after rice. At the same time, the ruling class of Baekje and people from Goguryeo, both Proto-Koreanic, came to Japan as well. However, genetically speaking, the the Proto-Japonic and Proto-Koreanic are very close. So, this did not introduce strikingly new components. Although Silla conquered the other two kingdoms, there were a substantial number of immigrants from Silla to Japan as well.

By this time, Japan has established a central government. Learning form history, they were extremely careful about how to deal with the immigrants, who must have surpassed the local residents in number. They knew how to take advantage of the immigrants of different backgrounds. They kept the control of the emerging Japan (at least for the time being) and certainly kept the language (Old Japanese).

As for farming, the central government must have been glad to have more hands. Wet-paddy rice farming is labor intensive and the Japanese may not yet have accomplished the high level of success in this area. Instead of using rice mainly rituals, they started to actually feed on it. And in general, it would be easier to manage farmers.

As for high-ranking immigrants, the central government also had ideas. They needed clerks who are capable of recording events and managing sophisticated rituals. For the engineers and technicians, there must have been abundant projects, including building, rice-paddy irrigation, and transportation infrastructure. In addition, the immigrants introduced horses. It is quite obvious how highly this animal was regarded at the time. There are a number of shrines related to the horse.

Another strategy of the central government was to deploy the immigrants to the eastern part of Japan, which was not as well developed as the western part. And when the central government feared the power of immigrants, they had a plan as well. For example, they had moved thousands of immigrants to an unoccupied remote area. But when they did that, they also gave a token, high rank to the leader of that settlement. The central government had also moved a number of religious and high-ranking people to a confined location, presumably to control their influence on the public.

The eternal goal of the central government must be the No. 2 in Asia. It was inconceivable for the Japanese to surpass China at that time. But they thought that they can surpass Korea. But this dream steered Japan in the most horrifying direction far later in its history.

Conclusion

So, here is our Revised Hypothesis. It should also serve as a summary of this musing.

Revised Hypothesis: Around 9000 BP, a millet-farming civilization emerged in the West

Liao River basin. Farming lead to population growth and the spread of its people and their language to the surrounding areas. Some population groups moved southward and at around 6500 BP, split into two subgroups. These subgroups are considered Proto-Koreanic and Proto-Japonic and were both moving toward the Korean Peninsula. At around 3500 BP, the Proto-Japonic people encountered wet-paddy rice farmers from China moving through the Liaodong and the Shandong Peninsulas. After working under the Chinese, the Proto-Japonic people learned rice farming. At around 3000 BP, the Proto-Japonic people migrated to Japan, introduced wet-paddy rice farming and a new language, and formed the basis of the Yayoi people. Then, during the Kofun period, the Chinese people also immigrated to Japan, introducing their genes to the present-day Japanese.

Appendix A: Our View of Robbeets et al. (2021)

We consider this research quite interesting and very comprehensive and do not disagree with its big picture. It was a perfect starting point for us. However, there are a few points we need to address.

First, except for the basic linguistic data, the Turkic connection seems rather sketchy. Second, we noticed that the genetic connection between the West Liao River basin and Mongol is questioned by Wang et al. (2018).

Third, we noticed that Kim & Park (2020) is critical on the earlier work of Robbeets. They are critical of Robbeets' 'farming/language dispersal theory' (FLDH) applied to this problem. Here, we address two specific points.

One is about the introduction of millet farming to the Korean Peninsula by the Proto-Japonic people. The interaction between the Proto-Japonic and the Jomon people (earlier arrival) was gradual. Although they initially went on their own business as usual, the gradual increase of the Proto-Japonic's farmland started to deplete the Jomon's hunting ground. Only at this point, the Jomon gave up their way of living and joined the Proto-Japonic.

The other point is that the introduction of rice farming to the Korean Peninsula was sudden and drastic. As soon as the new immigrants are established, the culture in the area changed. FLDH cannot explain qualitative differences such the two cases discussed above. We consider Kim & Park's criticism quite reasonable. So, we tried to incorporate some of their ideas in our musing.

Appendix B: Korean-Japanese Connection

In this musing, we touched upon the relationship and interaction between the Koreans and the Japanese. Here is a summary. Both of them originated on the West Liao River basin about 9000 BP, where millet farming was the central business. Also, the people there seem to have some Amur-River-area genes from the beginning. In search for new land, people there started to move. While moving southward, at around 6500 BP, the two groups started to branching out. This timing seems to be consistent with analysis of linguistic relatedness. This was long time ago, cf. the common ancestor of the giant Indo-European language family estimated at around 5500 BP. So, we can still say that the two languages are “related” but its relation is very, very far. This is evident when a Korean and a Japanese try to communicate orally. They can not at all understand each other, probably except for some common load words from China.

On the Korean Peninsula, the Proto-Japonic people must have mixed with the Jomon people who were still present at that time. This would not substantially affect the genetic analysis of the Japanese because the Proto-Japonic would mix with the Jomon also after reaching the Japanese archipelago.

After the separation, while the Proto-Koreanic people must have contact with the Tungusic people, the Proto-Japonic people, with the Chinese with Sino-Tibetan/Austronesian background. This may be vaguely reflected in the difference between the present-day Korean and Japanese.

After this point, while the Proto-Koreanic stayed (or moved around) the present-day Northeast China, the Proto-Japonic migrated to the Japanese archipelago, still leaving some population on the Korean Peninsula. However, as the remaining Proto-Japonic eventually disappeared from the peninsula, the trace of the Jomon genes also disappeared from the people in Korea.

After the Proto-Japonic people left, the Korean Peninsula was occupied by Chinese (with both northern and southern origins) and the Proto-Koreanic people. These people will become the basis of the present-day Koreans.

In Japan, after the Proto-Japonic people mixed with the Jomon people (except for northern remote areas), they will also receive genetic materials from Chinese (with both northern and southern origins). So, genetically speaking, the present-day Koreans and Japanese are similar (West Liao River, Amur, north/south Chinese), except that only the Japanese have Jomon components.

Appendix C: The Ryukyu People and Language

When the Jomon people arrived at the Japanese archipelago, they occupied all of Japan, including the Ryukyu islands (with its main island of Okinawa at the southwestern end of Japan). When the Proto-Japonic arrived, they also moved to all directions and mixed with the Ryukyu people. Note that the Ryukyu descendants in general have more Jomon genes than the mainland Japanese.

This contrast with the case of the Ainu people, who are considered to be direct descendants of the Jomon people without the genes of the Proto-Japonic or Chinese origins. The Ainu language is completely different from Japanese and normally classified as isolate. So, genetically speaking, the Ryukyu people are Japanese. Basically the same can be said about their language. However, due to the remoteness of the Ryukyu islands, their dialect reflected the change in the mainland Japanese hundreds of years later (when there was no electronic communication).

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